

Tilburg University

Where is the love? The social aspects of mimicry

van Baaren, R.; Janssen, L.; Chartrand, T.L.; Dijksterhuis, A..

Published in:

Philosophical Transactions of the Royal Society B: Biological Sciences

Publication date:

2009

Document Version

Publisher's PDF, also known as Version of record

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):

van Baaren, R., Janssen, L., Chartrand, T. L., & Dijksterhuis, A. (2009). Where is the love? The social aspects of mimicry. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1528), 2381-2389.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Where is the Love? The social aspects of mimicry

Journal:	<i>Philosophical Transactions B</i>
Manuscript ID:	RSTB-2009-0057
Article Type:	Research
Date Submitted by the Author:	06-Apr-2009
Complete List of Authors:	van Baaren, Rick; Radboud University Janssen, Loes; University of Twente Chartrand, Tanya; Duke University Dijksterhuis, Ap; Radboud University
Issue Code: Click here to find the code for your issue.:	imitation
Subject:	Behaviour < BIOLOGY
Keywords:	Imitation, Social, Humans

Running head: Social side of mimicry

Where is the Love? The social aspects of mimicry

Rick van Baaren

Radboud University Nijmegen

Loes Janssen

Twente University

Tanya L. Chartrand

Duke University

Ap Dijksterhuis

Radboud University Nijmegen

Wordcount main text: 4991

Abstract

One striking characteristic of human social interactions is unconscious mimicry; people have a tendency to take over each others posture, mannerisms and behaviors without awareness. Our goal is to make the case that unconscious mimicry plays an important role in human social interaction and to show that mimicry is closely related to and moderated by our connectedness to others. First we will position human unconscious mimicry in relation to types of imitation used in cognitive psychology and cognitive neuroscience. Then we will provide support for social moderation of mimicry. Characteristics of both the mimicker and the mimickee influence the degree of mimicry in a social interaction. Next, we turn to the positive social consequences of this unconscious mimicry and we will present data showing how being imitated makes people more assimilative in general. In the final section, we discuss what these findings imply for theorizing on the mechanisms of imitation and point out several issues that need to be resolved in before a start can be made to integrate this field in the broader context of research on imitation.

Imitation, by definition, is a truly social phenomenon: It takes two to imitate. Although at first glance this statement may seem somewhat trivial, the social nature of imitation in fact has not been fully appreciated by current theorizing on imitation. Whereas we know a lot about the mechanisms of imitation from a cognitive-, developmental- and neuropsychological perspective, the social moderators and consequences are less well understood. Do we imitate everybody or are we more selective? How does our relationship to the mimicker or mimickee moderate imitation and its consequences? What are the social consequences of imitation? The purpose of this paper is to present evidence for the social side of imitation and by doing so, hopefully inspire other disciplines to integrate these findings in their theorizing and empirical work. It is not the intention to provide a complete review of all the work done on mimicry (for a review, see Chartrand & Van Baaren 2009), instead the paper is written to make a strong case for social processes in this type of imitation.

In the next sections we will provide evidence for social moderators and consequences of mimicry, where after we will discuss the fit and misfit with current theorizing. It is not our intention to integrate the present chapter in the theorizing done in other chapters in this special issue, simply because there is just too little research on this type of mimicry in cognitive psychology and cognitive neuroscience. What we do instead is point out which questions, in our view, should be addressed by studies in the near future. First, however, we will clarify what type of imitation is the focus of this paper

Type of imitation: Unconscious human mimicry

The social psychological studies providing evidence for the social side of imitation have mostly focused on *human mimicry*. In this field, mimicry is defined as *unconscious* or automatic imitation of gestures, behaviors, facial expressions, speech and movements (for an extensive review see Chartrand & Van Baaren 2009). A prototypical example is when two people in a bar are involved in a conversation and are unaware of the fact that they take on the same posture, nod their heads, and make the same face rubbing or hair touching movements. This type of mimicry thus is different from the more conscious types of imitation which have been studied in the realm of learning, modeling and acculturation (e.g. Bandura, 1962). This type of mimicry is also different from the types used in research in cognitive psychology and cognitive neuroscience that has focused on imitation (see other chapters in the special issue). The difference in this case centers around awareness; are you aware of the behavior you see and are you intentionally trying to copy it? When it comes to unconscious mimicry, the answer to those questions is “no.” In most cognitive and neuropsychological studies, at least one of these questions is answered by “yes.”

A related key difference between the social psychological studies and most of the studies in cognitive- and cognitive neuroscience is the relative focus on ecological versus internal validity. Most studies on unconscious mimicry use an observational method and one is in a sense waiting (like an amateur bird-watcher) until the behavior to be imitated is *spontaneously* produced. This is in contrast with many tasks used in cognitive- and cognitive neuroscience where often a stimulus-response compatibility task is used (e.g. Brass, Bekkering and Prinz 2001; Iacoboni et al, 1999; Massen & Prinz, this issue, Prinz, 1990) and the behavior of interest is either instructed/inherent in the task or participants

are consciously observing a behavior and their spontaneous motor or neurological responses are coded.

It is important to realize that in studies on unconscious human mimicry, mimicry is just a by-product in the interaction. The participants are focusing on something completely different (e.g. working on a picture describing task (Chartrand & Bargh, 1999) or judging advertisements (Van Baaren et al, 2003)) and they are unaware of the behavior, the mimicry and the fact that the researchers may in fact be interested in something else than the irrelevant task the participant is working on... . In sum, the type of imitation we have researched most extensively is unconscious, peripheral mimicry.

A prototypical example of an experimental investigation of human unconscious mimicry is the “Chameleon Effect” (Chartrand & Bargh, 1999). In this research, participants interacted with an unknown confederate in two consecutive picture-describing sessions. In one session, the confederate either rubbed her face or shook her foot while describing the pictures with the participants, while the second confederate performed the behavior that the first confederate did not. The behavior of the participants, “secretly” recorded on videotape, showed that participants shook their foot more in the presence of the foot-shaking confederate, and rubbed their faces more in the presence of the face-rubbing confederate. Debriefing indicated that participants were unaware of their mimicry.

Evidence for social moderators: Mimicker characteristics

The Chameleon effect (Chartrand & Bargh, 1999) did show that there is an automatic human tendency to mimic behavior and mannerisms. However, subsequent research revealed we don’t imitate *everyone all the time*. Our tendency to unconsciously

mimic is moderated by both enduring and temporary characteristics of the mimicker and the mimickee.

First, nonconscious mimicry is increased when people are more focused on the individuals around them. Providing initial support for this contention, Chartrand and Bargh (1999, Study 3) found that people high in perspective taking (i.e., who are paying more attention to those around them) mimicked the behavior of a confederate to a greater extent than those low in perspective taking.

Additional evidence for the moderating role of concern with others comes from research by van Baaren, Maddux, Chartrand, de Bouter and van Knippenberg (2003). In three studies that either temporarily primed self-construal orientation or compared participants from different cultures, an interdependent self-construal was associated with more automatic mimicry than was an independent self-construal. In essence, self-construal refers the extent in which people perceive themselves as unique individuals, independent of others instead of connected to- and dependent on others (see Brewer & Gardner, 1996). Even though in general some people are enduringly more dependent than independent, self-construal can be temporarily be modified. For example, priming participants by presenting them or having them read words like “I”, “me” or “mine” versus “we” “us” or “our” temporarily shifts their self-construals on the social-personal dimension. This in turn influences the degree of unconscious mimicry in a subsequent interaction with a stranger (Van Baaren et al, 2003, study 2). That is, participants with either a temporary or enduringly dominant interdependent self were more likely to nonconsciously take on the behaviors and mannerisms of a confederate. Using a stimulus-response compatibility task

(a dependent variable more common to cognitive psychology compared to spontaneous mimicry), Leighton, Bird, and Heyes (2008) recently conceptually replicated this effect.

Finally, enduring or temporary attention to and concern with others have been shown to moderate the extent to which individuals mimic an interaction partner. For example, an affiliation goal is associated with more mimicry than no affiliation goal, as has been shown by Lakin and Chartrand (2003). This held regardless of whether the goal was consciously held after getting explicit instructions to get along with another person, or nonconsciously held after being subliminally primed with affiliation-related words such as affiliate, friend, team, partner, and like.

Thus, when we are more concerned with others, depend more on them, feel closer to them, or want to be liked by them, we tend to take over their behavior to greater extent. This malleability of mimicry is beautifully captured by Brewer’s optimal distinctiveness theory (1991). The theory suggests that people try to strike a balance between a desire for distinctiveness (i.e., feeling unique and different from others) and a desire for assimilation or belonging (i.e., feeling similar to others). When people feel too distinct or too similar, they are motivated to regain the balance. Thus, they have a need to assimilate activated in situations where they feel unusual or different. In a study applying the principles of this theory to mimicry behavior, Uldall, Hall, and Chartrand (2008) had participants complete a supposed “personality test.” They were given (bogus) feedback on the test that indicated they had a “personality type” that was either very similar to most others at their undergrad institution or one that was extremely unusual at their university. Participants then interacted with another student (actually a confederate), and those who had earlier been

1
2
3 told they were very different from others at their school engaged in more mimicry of the
4
5 confederate than those who had been told they were similar to others at their school. This
6
7 suggests that people mimic more when they are feeling too different from in-group
8
9 members. Mimicry is a way that people (nonconsciously) regain their “optimal” balance
10
11 (Brewer, 1991) by affiliating with others in an effort to belong. It is important to note the
12
13 difference between priming or activating a self-construal and the manipulation used in the
14
15 Uldall et al. (2008) study. Whereas an independent or interdependent self-construal are
16
17 self-construals that can differ between and within people, depending on context, the Uldall
18
19 et al. manipulation entails an extremely dependent or independent priming. This means
20
21 that it is outside the “normal” boundaries of how we relate to others and we
22
23 (unconsciously) feel the need to restore the balance. In the experiments on affiliation goals
24
25 and self-construal, however, the priming is not extreme and people assimilate to the prime,
26
27 instead of restoring a balance. Extremity is the moderating principle here (Brewer, 1991).
28
29
30
31
32
33
34
35

36 Social processes can extend to a basic perceptual and cognitive level and research
37
38 from cultural and social psychology indicated that the mimicker characteristics, such as
39
40 self-construal are correlated with the perceptual and cognitive mimicker characteristics (Ji,
41
42 Peng, & Nisbett, 2000; Witkin, Goodenough, & Oltman, 1979; Witkin & Goodenough, 1981).
43
44 Field dependence, for example, which refers to the phenomenon of perceptually integrating
45
46 objects in their context, goes together with socially being more attuned to others. On the
47
48 other hand, field independence, which is the tendency to perceptually isolate objects from
49
50 their contexts, is related to a socially independent mindset. In three experiments by Van
51
52 Baaren, Horgan, Chartrand & Dijkmans (2004) the cognitive styles (field dependency
53
54 versus field independence) were either measured or experimentally primed and the n the
55
56
57
58
59
60

degree of unconscious mimicry in a subsequent interaction was measured. As expected, the more field dependent participants were on a test of cognitive style (e.g. the Hidden Figures Test, Witkin, Oltman, Raskin, & Karp, 1971) the more they mimicked their interaction partner. This attests to the idea that the mimicker characteristics influencing our unconscious mimicry are deeply rooted and fundamental.

Evidence for social moderators: Mimickee characteristics

Another important social moderator of mimicry is our evaluation of the characteristics of our interaction partner. When we like a person, or his/her ethnicity, group membership or social status, we will imitate that person to a greater extent compared to when we do not positively evaluate those characteristics. Johnston and colleagues have conducted several experiments providing evidence for this effect. First, Johnston (2002) investigated the impact of a social stigma on mimicry. In two studies, participants were ostensibly working on a ice-cream tasting task together with another person (a confederate), who had or had not a visible social stigma (being obese, or having a facial scar). The confederate ate a lot or a little ice cream and it was assessed whether the participant mimicked the ice cream consumption. The results revealed indeed a mimicry effect of the participants consumption, however, no mimicry occurred when the confederate had a visible social stigma. The theory is that mimicry (unconsciously) creates a bond or connection between individuals and that humans automatically and unconsciously try to prevent mimicry in cases where do not want to bond with another person.

Taking it more broadly than social stigma, Stel, van Baaren, Blascovich, McCall, Pollmann, van Leeuwen, Mastop, Muller, and Vonk (2008) have explored the relationship between evaluation or liking of a target and mimicry. In a first study where participants' a priori liking for a target was manipulated and their mimicry of that person was then measured, they found that when a target is disliked, facial mimicry is attenuated. In another study, a reaction time measure to assess implicit associations (IAT, see Greenwald et al., 1998) towards Dutch and Moroccans was administered. With this measure, the relative evaluation of Dutch versus Moroccans can be quantified. In a subsequent session, participants watched videos of both a Dutch actor and a Moroccan actor performing some clerical tasks and in addition performing some subtle behaviors, such as face/hair touching and pen-playing. Hidden videocameras registered the participants' behaviors and it was found that the implicit attitudes correlated with unconscious mimicry, that is, the more negative participants were towards Moroccans relative to Dutch, the relatively less they mimicked a Moroccan compared to a Dutch actor. Similar results were previously obtained by Yabar, Johnston, Miles, and Peace (2006), where instead of ethnic attitudes, implicit attitudes towards Christians (versus non-Christians) were used. Finally, Several other studies found main effects of ingroup-outgroup distinction on mimicry. Heider and Skowronski (2008) conducted a study in which African-American and Caucasian participants interacted with two confederates one after the other, one African American and one Caucasian. They found more mimicry of ethnic ingroup members than ethnic outgroup members. Similarly, Bourgeois and Hess (2008) found more facial mimicry of ingroup members than outgroup members.

In sum, there is ample evidence for social moderation of mimicry, the human nonconscious tendency to imitate. We do not just imitate *everybody all the time*. We imitate more when: we feel connected to others, others are important, we want to affiliate with others, we are socially oriented or have a assimilative cognitive style. Furthermore, in addition to these more general mimicker characteristics, the characteristics of the mimickee also moderate mimicry. Apriori evaluations of those targets predict our subsequent mimicry.

In the next section we discuss another line of evidence lending strong support for a view that mimicry is closely related to, influences and is influenced by social processes in human interactions. Then, we move on to an attempt to integrate these social moderators and consequences in current theorizing on imitation.

Social consequences of unconscious mimicry: on the dyad

In many commercial books on influence and making friends, imitation is offered as one of the means to create a good impression, have a positive relation or rapport with others (e.g Lieberman, 2000). There is now experimental evidence that this indeed occurs. Positive social consequences have been observed for mimicry of body movements and speech variables. In a typical experiment, a participant and a confederate work on an irrelevant task. During that task, the confederate mimics (or not) the posture, mannerisms, and behaviors of the participant after a short delay. These can be gestures or movements such as face-rubbing, foot-shaking, playing with a pen, orientation of the body (avoiding movements that indicate power or status), or speech variables such as using the same phrases of speech. This subtle mimicking almost always is completely unnoticed by the

participant. After this imitation manipulation, the dependent variable is assessed, which is often an evaluation of or behavior towards the confederate.

Chartrand and Bargh (1999) found that participants who were subtly mimicked by a confederate liked that confederate more and had smoother interactions with that confederate. The developmental psychology literature documents evidence that infants react more favorably towards adults who imitate them than adults who do not (Asendorpf, Warkentin, & Baudonniere, 1996; Meltzoff, 1990). Interestingly, similar consequences have been observed in human-computer interactions. Bailenson and Yee (2004) had a realistic interface agent (i.e., an avatar using virtual reality technology) either imitate the participant's head movements or perform different head movements. The imitating interface agents were rated as more likeable and more persuasive than the non-mimicking avatars. Similarly, Suzuki, Takeuchi, Ishii, and Okada (2003) found that mimicry of certain (prosodic) properties of a participant's voice by a computer agent led to more favorable evaluations of the computer agent. Thus, the evaluative consequences of imitation are not unique to human-human interactions.

Van Baaren et al. (2004, Experiment 1) found that being imitated not only influences evaluations such as liking or rapport, but also makes people behave in a more pro-social manner. In this study, a mimicking or non-mimicking experimenter "accidentally" dropped several pens on the floor. The dependent variable was whether participants got off their chairs and started to help (a measure developed by Macrae & Johnston, 1998). The results revealed that imitated participants were considerably more helpful than non-imitated participants. This effect was recently replicated with eighteen-month old children (Carpenter, Uebel & Tomasello, 2008).

What was confounded in the studies on the consequences of imitation, is that the effects of imitation were measured vis-a-vis the imitator. This is important to note, because it could theoretically be possible that the effects of imitation are not restricted to the dyad and the imitator. Perhaps the effects extend beyond the relation between the imitator and the imitated. Accordingly, it affects the imitated person in a more fundamental way. It is possible that imitation makes one more pro-socially oriented in general.

Social consequences of unconscious mimicry: beyond the dyad

Initial support for this idea was obtained in studies looking at the effects of being mimicked on behavior towards other people than the mimicker (Van Baaren et al, 2004). Similar to the previously described experiment, participants were mimicked or not by an experimenter and the effects on prosocial behavior were assessed. This time, however, the experimenter who mimicked the participant said he was finished, that a new experimenter would come in and left the room. After a while, the new experimenter entered the room and dropped the pens on the floor. Were mimicked participants more prosocial after being mimicked, even though the person was somebody else than the mimicker? The results revealed indeed that also this new person benefited from the increased pro-sociality of a mimicked participant. It could be the case that these results can be explained by a transfer of the pro-social orientation toward the mimicking experimenter onto the new experimenter, because they have similar roles and operate in the same setting. To control for this, the next study looked at prosocial behavior towards an abstract, non-human entity: donation to a charity. After the imitation manipulation, participants were left alone in a room, with the money they received for participating and they were asked to fill out a

questionnaire on the “CliniClowns” a Dutch charity trying to alleviate the stay in a hospital for seriously ill children. There was a sealed collecting box in the corner of the room and participants were in the position to anonymously donate or not. Whereas non-mimicked participants on average donated a little under 40 eurocents to the Cliniclowns, the donation increased upto almost 80 eurocents for those whose behavior had been mimicked.

Social consequences of unconscious mimicry: Self-construal

How can these general consequences be explained? As was described in the section on moderators of mimicry, self-construals are intimately linked to unconscious imitation. A interdependent (or social) self-construal goes hand in hand with mimicry and prosocial behavior, whereas an independent (or personal) self-construal is associated with less mimicry. A bi-directional link between this mindset and mimicry could explain the general social consequences described in the previous paragraph. Ashton-James, van Baaren, Chartrand, Decety, and Karremans (2007) tested the idea that self-construal may mediate the effect of mimicry on prosocial behavior. In one of the experiments, participants were mimicked or during an initial interaction. After this mimicry manipulation, their self-construal was assessed using the “Twenty Statements Test” (TST, Kuhn & McPartland, 1954), in which participants have to give twenty answers to the question “Who am I?” The answers to this test are then coded for interdependence (social roles, connections to others, e.g. I am Tom’s brother) and independence (unique attributes, personal characteristics, e.g. I am tall). After the TST, the measure of prosocial behavior (in general) took place. The participant was asked to help another researcher, who was unable to pay them, with another experiment. Ashton-James et al. (2007) indeed found an effect of

mimicry on both self-construal and prosocial behavior and, in line with the hypotheses, self-construal mediated the mimicry-prosocial effect. Thus, being imitated makes people feel more attuned to and connected with others.

As was previously mentioned, there is an intimate link between self-construal and cognitive style. Assimilation on a behavioral level goes hand in hand with an assimilative information processing style, implying that if being mimicked leads to a social self-construal then it should also lead to an interdependent (field-dependent) cognitive style. Van Baaren et al. (2004, exp 3) found evidence for this hypothesis. After a mimicry manipulation, participants whose behavior had been unobtrusively copied scored better on a memory task sensitive to contextualized memory (Chalfonte & Johnson, 1996). In this measure, the relative position of an object in relation to other objects is the focus of interest and an example of an interdependent processing style.

Present Study

However, it remains the question whether being mimicked really leads to an assimilative mindset. Instead, it could be the case that, through mimicry, we tend to relate people and objects to their context and see them in relation to other people and objects, but we do not necessarily have to *assimilate* object and context. Contrast could also be an outcome of such a comparative process. Here, we will present a study designed to test whether mimicry indeed truly leads to an assimilative tendency. Do people actually see more similarities between objects or people after being mimicked? To test this, a measure developed by Mussweiler (2001) will be used (see appendix 1). In this task, participants see two different pictures and are asked to rate how similar they find them. There are no

right or wrong answers and because there is no context or comparison to other pictures, there are no anchors to perform the task. Hence, the similarity judgment is based on a general tendency to assimilate or contrast. In this experiment we will test the hypothesis that being mimicked indeed moves people to be more assimilative in general and we expect mimicked participants to perceive more similarity between the two pictures.

Method

Participants and design

Twenty-one students from Radboud University Nijmegen were randomly assigned to one of two between-subjects conditions, Mimicry(yes versus no), and received 1 euro for participation in this brief experiment.

Procedure

Upon arrival at the laboratory, the participant was brought to a room by the experimenter and was asked to take a seat at a table with two chairs. The experimenter seated herself on the other chair and explained they will discuss some recent advertisements. During this discussion, she unobtrusively mimicked (or not) the spontaneous behavior of the participant (e.g. facial expressions, face/hair touching, movements by feet or arms) with a 4 second delay. The interaction lasted between 5,5 and 6 minutes. After this mimicry manipulation, the experimenter handed the similarity measure to the participant and left the room.

Results and discussion

To test the effect of mimicry on assimilation, a t-test was performed. As predicted, mimicked participants perceived more similarity between the two random pictures ($M = 6.91, SD = 1.14$) compared to non-mimicked participants ($M = 5.6, SD = 1.51$), $t(21) = 2.26$, $p < .05$.

These results demonstrate that being imitated changes the way we perceive and interact with other people on a fundamental level. After being imitated, we perceive more similarity between objects, feel more similar to others and behave in a more prosocial manner. What remains a great challenge for future research is finding out how these effects occur chronologically. What exactly activates this assimilative mindset and the related self-construal? What ingredient in mimicry triggers these assimilative and social processes? In our view, at this stage of research on the social aspects of mimicry, now is the time to focus on the neural correlates of being imitated. Until we have found sound ways to measure being imitated in the brain, the magic of mimicry remains a mystery.

In all the experiments on the consequences of being mimicked that have been described so far, the interaction is always between two strangers. In all these cases, the consequences have been positive. What happens when we apriori do not like a person? Does that yield the same results or can mimicry actually backfire?

Social consequences of unconscious mimicry: when it backfires

Likowski, Schubert, Fleischmann, Landgraf, and Volk (2008) examined the boundary conditions of the positive consequences of being mimicked. Specifically, they found that being mimicked by a member of an outgroup makes an individual like the outgroup member *less*, not more. Thus, outgroup members who mimic are *less* liked than outgroup

members who do not mimic. In a second study, they examined walking synchrony. A synchronized ingroup member was liked more than a non-synchronized ingroup member, but the opposite was found for outgroup members (a synchronized outgroup member was liked less than a non-synchronized outgroup member). Interestingly, the authors also found that the effect extends to liking of the ingroup or outgroup as a whole; being mimicked by an ingroup member leads to more liking of the ingroup, whereas being mimicked by an outgroup member leads to less liking of the outgroup.

Wigboldus, Van Gaal, Dotsch, and Van Baaren (2008) showed that the consequences of being imitated by an outgroup member are moderated by implicit prejudice. The head movements of white Dutch participants were unobtrusively mimicked or not by an avatar in an immersive virtual environment. For half the participants, the avatar was Dutch looking, for the others he was Moroccan looking. The results showed that for low-prejudiced people, the “normal” effect of being mimicked occurred: a mimicking avatar was evaluated more positively than a non-mimicking avatar. Importantly, this effect was reversed for high-prejudiced participants who were mimicked by an avatar with typical Moroccan features; they evaluated the mimicking avatar less favorably compared to the non-mimicking one.

A final interesting phenomenon where mimicry is not the default is complementarity, or the tendency to automatically react opposite to the observed behavior. When behavior is related to status, power or hierarchy, humans seem not to imitate. Instead, dominance automatically triggers submissiveness and vice versa (Tiedens & Fragale, 2003; Wiggins, 1982). Tiedens & Fragale (2003) for example manipulated the

dominance or submissiveness of a confederate’s posture (e.g. wide versus narrow) and observed how the participant’s posture changes over time in response to the confederate. They found evidence for automatic complementarity; when participants were faced with a dominant confederate, their own body gradually and unconsciously took up less space, whereas they tended to extend their bodies in space when interacting with a submissive confederate.

Implications for theorizing on imitation

How do these social moderators and consequences fit within the broader theories on the mechanisms of imitation presented elsewhere in this issue? At the present time, this question can not be answered by empirical data and any theorizing is at best speculative. The field of unconscious mimicry has worked in isolation too long. What can be done, however, is to focus on the research described in this chapter and to distill and highlight those aspects of the data that need an explanation or may be of interest to theories on imitation in a broader sense.

First of all, unconscious mimicry is surprisingly flexible, in some cases it occurs more than in others and there are even circumstances where a tendency to act complementary instead of assimilative is revealed. Second, given that the studies reported here on the consequences of imitation concern effects of which the mimickee is *unaware* , we need to be able to explain how our brains unconsciously code or “recognize” we are being imitated or not and how that affects our brains in such a way that we become more prosocial (or less in cases of not liked targets).

In our view, these aspects are currently not well understood and thus any suggestion on possible integration is inherently speculative. However, regarding the flexibility of mimicry, there are two theories that provide an architecture (theoretically or neurologically) in which flexibility of sensory-motor couplings may occur: Heyes' Associative Sequence Learning theory on sensorimotor associations (e.g., Heyes, 2001) and Keysers and Perrett's Hebbian Perspective on the mirror system (Keysers & Perrett, 2004). In both these theories, the mirror system acquires its properties by learned associations between sensory input and associated actions. When there is consistent co-activation between sensory and motor neurons, in time, these neurons become capable of mutual activation. When you wave your hand and you always see your hand wave, a direct link between the perception of a waving hand and waving it occurs. This in turn, due to sensitivity to both endogenous and exogenous stimuli in the mirror system, can lead to (pre)motor activity when we see somebody else move a hand. Importantly, this can also explain why we sometimes respond in a complementary way. If we learn in life that it is healthier to respond submissively to dominant people, and vice versa, the same mechanisms of associated sensory-motor couplings can explain these automatic complementary movements. Recent work by Catmur and colleagues (Catmur, Gillmeister, Bird, Liepelt, Brass, & Heyes, in press; Catmur, Walsh, & Heyes, 2007) provides evidence for this flexibility of the mirror system (Catmur, Walsh & Heyes, this issue). In their study, a training paradigm was introduced where different types of sensory-motor couplings were trained; compatible combinations (e.g. responding with a hand movement when observing a hand movement) and incompatible combinations (e.g. responding with a foot movement when observing a hand movement or vice versa). When participants were trained in

1
2
3 incompatible combinations, a reversal of the typical compatibility effects were found on a
4
5 reaction times measure; participants were actually faster on compatible compared to
6
7 incompatible trials. In addition, using fMRI, the corresponding effect also occurred in the
8
9 mirror system. After incompatible training, the activation of the action observation parts of
10
11 the mirror system were modulated by training. Conceptually similar effects were observed
12
13 on a muscular level using TMS and a hand opening -hand closing task.
14
15
16
17

18
19 Relating this to the work on human unconscious mimicry and the finding that
20
21 mimicry is moderated by apriori liking of the target (or his/her group), it would suggest
22
23 that this system is also sensitive to context. Training, or task demands are one type of
24
25 context, but the characteristic of the person whom we are about to mimic is another
26
27 important context. On a sensory level, the behavior we observe is integrated in a more
28
29 complex array of stimuli: time, place, race, prior experience, expectations etcetera. If the
30
31 mirror system is flexible in the sensory-action couplings, then these peripheral aspects of
32
33 the sensory input could be capable of influencing the type or direction of sensory-action
34
35 coupling.
36
37
38
39

40
41 A possible mechanism, which may help to explain how liking of a target moderates
42
43 mimicry is provided by Brass, Spengler & Ruby (this issue). They describe the function of a
44
45 brain circuit , comprised mainly of aFMC and TPJ, that plays a crucial role in distinguishing
46
47 self from other. It is possible that such a system plays an important role both in mimicry
48
49 and in the consequences of being mimicked. The more self-other overlap we “feel” the more
50
51 we will mimic the other and the more positive the consequences of being mimicked by that
52
53 other will be. Future studies will be needed to test this idea and find evidence for
54
55
56
57
58
59
60

connections between this “different-from-me” mechanism and the brain mechanisms responsible for unconscious mimicry and its consequences.

Finally, regarding the consequences of being imitated, the first question that needs to be addressed is how our brain detects we are being imitated, even though we do not consciously realize it. Theoretically, the difference between being and not being imitated can be conceptualized as the presence or absence of compatible sensory and motor concepts. When we are imitated it means our sensory and motor activation resemble each other more compared to cases where we are not imitated. How the brain detects this and how that subsequently affects our prosocial orientation is still a mystery. Although the suggested link between the neural bases of imitation and empathy (Decety & Jackson, 2004; Goldman, 2005; Meltzoff & Decety, 2003; Preston & de Waal, 2002) may be a starting point (also see Bastiaansen, Thioux & Keysers, this issue). Both (automatic) imitation and empathy seem to share at least for a large part the same neural mechanism. In addition, De Vignemont & Singer (2006) describe the contextual malleability of empathy, where our empathic response to others is modulated by, among others, individual characteristics and relational factors. Whereas an empathic response to a specific person is something else than a general assimilative mindset, the consequences of being imitated and empathy may show considerable overlap.

Before closing, however, the mere fact that unconscious mimicry is so pervasive and omnipresent in humans is in itself relevant two several chapters in this special issue. First of all, Ferrari, Bonini & Fogassi (this issue) describe two possible mechanisms by which mirror neurons can influence behavior. A “direct” and “indirect” way. According to these

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

authors, direct imitation, of which unconscious mimicry seems to be an example, is only present early in human development. Coming with age, this direct translation of perception into action is less and mirror neurons influence behavior less directly. However, this seems to be at odds with the review of studies on unconscious mimicry in this current chapter. One possible explanations is that unconscious mimicry occurs completely outside of awareness and when it does become conscious, people tend to stop or control it immediately. The type of imitation used by Ferrari et al and the vast majority of studies on imitation in cognitive psychology and cognitive neuroscience is not unaware and is not tested in a truly ecological valid social context. In young children, this disliking of conscious imitation seems not to be apparent., although this needs more research.

In addition, Whiten, McGuigan, Mrshall-Pescini & Hopper (this issue) theorize about the mechanisms which facilitate cumulative cultural learning in humans and chimpanzees and describe automatic imitation plays a fundamental role in this process. Whereas chimpanzees are capable of imitation, they seem to use/apply it more conservatively, while human children (and adults) seems to be “enthusiastic” imitators. Our chapter corroborates this view, at least from the human perspective in showing the omnipresence of mimicry.

A final point of concern is whether unconscious mimicry is a high level or low level automatic mechanism. In this chapter, we have repeatedly stressed its unconscious, and hence automatic nature. Conversely, we have presented moderators that seem to be more high-level, such a self-construal and liking. We think it will be a major challenge to explain how such seemingly high level psychological constructs interact with this low level motoric

phenomenon. One speculative possibility is that we automatically imitate (or complement) and we need inhibitory control to stop this phenomenon (see Van Leeuwen et al, in press?). The higher level moderators then may work as triggers for inhibition. Alternatively, high level moderators operate before the to be mimicked action is perceived and exert their moderating influence at the beginning of the process.

In sum, social processes play a crucial role in mimicry and most likely in most types of imitation. It now is the time to start to integrate this view in theories explaining the mechanisms of imitation. More emphasis on the ecological circumstances and context of imitation will undoubtedly inspire other disciplines and ultimately tell us more about the architecture of social interactions, of which imitation is a prime example. In the end, mimicry is a truly social phenomenon where multiple individuals are needed and influence each other. If we only focus on the micro-level or intra-individual aspects of mimicry, we may lose sight of the affective and emotional factors related to it, hence the title of this chapter: Where is the love?

References

Ashton-James, C. E., van Baaren, R., Chartrand, T. L., Decety, J., & Karremans, J. C. (2007). Mimicry and me: The impact of mimicry on self-construal. *Social Cognition, 25*, 518-535.

Bailenson, J. N., & Yee, N. (2005). Digital chameleons: Automatic assimilation of nonverbal gestures in immersive virtual environments. *Psychological Science, 16*, 10, 814–819.

Bandura, A. (1962). Social learning through imitation. In M. R. Jones (Ed.), *Nebraska symposium on motivation*. Lincoln NE: University of Nebraska Press.

Bavelas, J. B., Black, A., Chovil, N., Lemery, C. R., & Mullett, J. (1988). Form and function in motor mimicry. Topographic evidence that the primary function is communicative. *Human Communication Research, 14*, 275–299.

Bavelas, J. B., Black, A., Lemery, C. R., MacInnis, S., & Mullett, J. (1986). Experimental methods for studying “elementary motor mimicry.” *Journal of Nonverbal Behavior, 10*, 102–119.

Bavelas, J. B., Black, A., Lemery, C. R., & Mullett, J. (1986). “I show how you feel”: Motor mimicry as a communicative act. *Journal of Personality and Social Psychology, 50*, 322–329.

Bernieri, F. (1988). Coordinated movement and rapport in teacher-student interactions. *Journal of Nonverbal Behavior, 12*, 120–138.

Bourgeois, P., & Hess, U. (2008). The impact of social context on mimicry. *Biological Psychology, 77*, 343-352.

- Brass, M., Bekkering, H., & Prinz, W. (2001). Movement observation affects movement execution in a simple response task. *Acta Psychologica*, 106, 3-22.
- Brewer, M.B. (1991): The social self: On being the same and different at the same time. *Personality and Social Psychology Bulletin*, 17(5), 475-482.
- Cappella, J. N., & Planalp, S. (1981). Talk and silence sequences in informal conversations III: Interspeaker influence. *Human Communication Research*, 7, 117-132.
- Carpenter, M., Uebel, J., & Tomasello, M. (2008). *Mimicry increases prosocial behavior in 18-month-olds*. Manuscript in preparation.
- Catmur, C., Gillmeister, H., Bird, G., Liepelt, R., Brass, M., & Heyes, C. (in press). Through the looking glass: counter-mirror activation following incompatible sensorimotor learning. *European Journal of Neuroscience*.
- Catmur, C., Walsh, V., & Heyes, C. (2007). Sensorimotor learning configures the human mirror system. *Current Biology*, 17, 1527-1531.
- Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology*, 76, 93-910.
- Cheng, Y., Meltzoff, A., & Decety, J. (2007). Motivation modulates the activity of the human mirror-neuron system. *Cerebral Cortex*, 17, 1979-1986.
- Cialdini, R. (2001). *Influence: Science and practice*. Needham Heights, MA: Allyn and Bacon.
- Condon, W. S., & Ogston, W. D. (1966). Sound film analysis of normal and pathological behavior patterns. *Journal of Nervous and Mental Disease*, 143, 338-347.
- Condon, W. S., & Sander, L. W. (1974). Synchrony demonstrated between movements of the neonate and adult speech. *Child Development*, 45, 456-462.

Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. *Behavioral and Cognitive Neuroscience Reviews*, 3, 71–100.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. K. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, 74, 1464-1480.

Heider, J.D., & Skowronski, J.J. (2008). *Ethnicity-based similarity and the chameleon effect*. Manuscript submitted for publication, Austin State University.

Heyes, C.M. & Bird, G. (2007) Mirroring, association and the correspondence problem. In Haggard, P., Rossetti, Y. & Kawato, M. (Eds), *Sensorimotor Foundations of Higher Cognition, Attention & Performance XXII*. Oxford University Press, Oxford, pp. 461–479.

Iacoboni, M., Woods, R. P., Brass, M., Bekkering, H., Mazziotta, J. C., & Rizzolatti, G. (1999). Cortical mechanisms of human imitation. *Science*, 286, 2526–2528.

Johnston, L. (2002). Behavioral mimicry and stigmatization. *Social Cognition*, 20, 18-35.

Keysers, C., & Perrett, D. (2004). Demystifying social cognition: A Hebbian perspective. *Trends in Cognitive Science*, 8, 501-507.

Kuhn, M. H., & McPartland, T. S. (1954). An empirical investigation of self-attitude. *American Sociological Review*, 19, 68–76.

LaFrance, M., & Broadbent, M. (1976). Group rapport: Posture sharing as a nonverbal indicator. *Group and Organization Studies*, 1, 328–333.

Lakin, J., & Chartrand, T. L. (2003). Using nonconscious behavioral mimicry to create affiliation and rapport. *Psychological Science*, 14, 334–339.

Leighton, J., Bird, G., & Heyes, C. (2008). *Social attitudes modulate automatic imitation*.

Manuscript submitted for publication, University College London.

Likowski, K.U., Schubert, T.W., Fleischmann, B., Landgraf, J., & Volk, A. (2008). *Positive*

effects of mimicry are limited to the ingroup. Manuscript submitted for publication,

Universitat Wurzburg.

Maddux, W. W., Mullen, E., & Galinsky, A. (2008). Chameleons bake bigger pies: Strategic

behavioral mimicry facilitates integrative negotiations outcomes. *Journal of*

Experimental Social Psychology, 44, 461-468.

Mussweiler, T. (2003). Comparison processes in social judgement: Mechanisms and

consequences. *Psychological review*, 110, 472-489.

Over, H. *Mimicry and ostracism in children*. Manuscript in preparation, Max Planck

Institute for Evolutionary Anthropology, Leipzig.

Preston, S. D., & de Waal, F. B. M. (2002). Empathy: Its ultimate and proximate bases.

Behavioral and Brain Science, 25, 1-72.

Prinz, W. (1990). A common coding approach to perception and action. In O. Neumann & W.

Prinz (Eds.), *Relationships between perception and action* (pp. 167-201). Berlin:

Springer-Verlag.

Stel, M., van Baaren, R., Blascovich, J., McCall, C., Pollmann, M.H., van Leeuwen, M., Mastop,

J., Muller, B.C.N., & Vonk, R. (2008). *Mimicry and liking: Is it really that simple?*

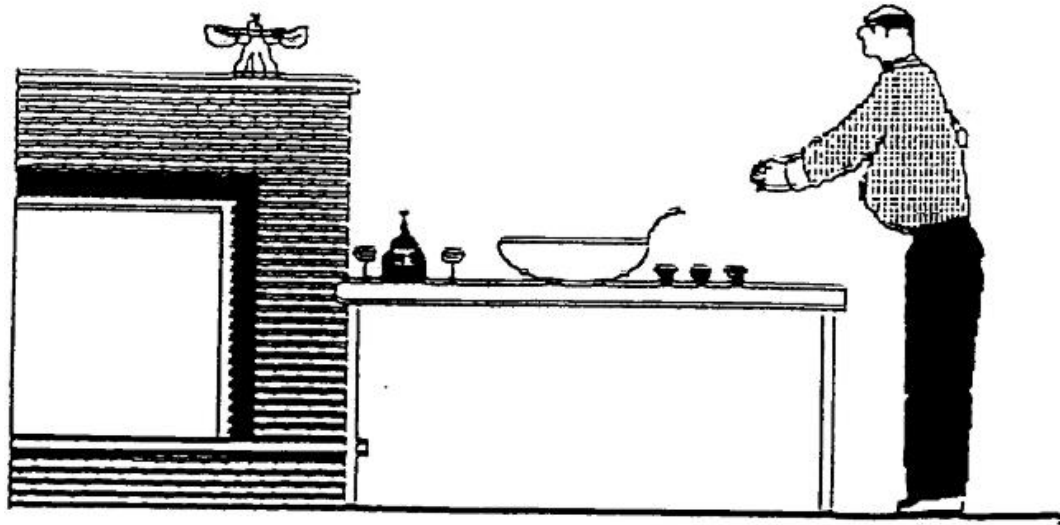
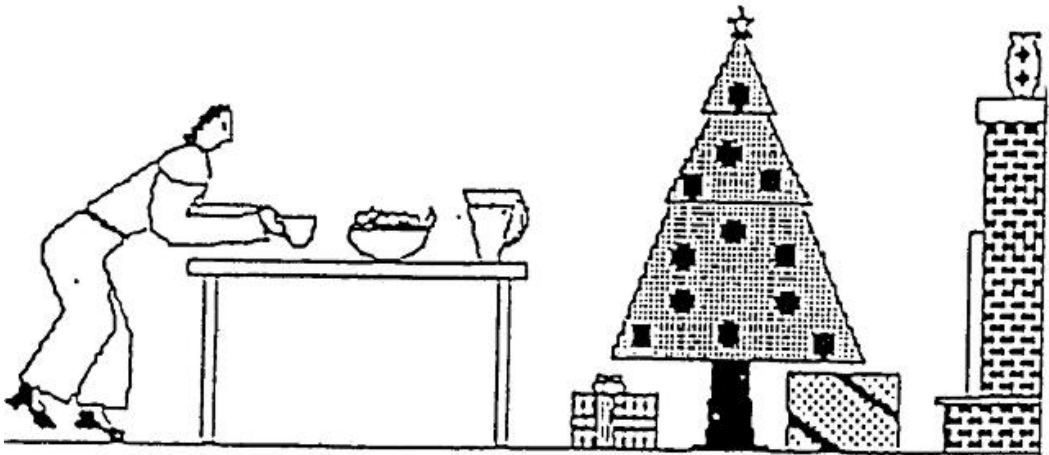
Manuscript submitted for publication, Leiden University.

- 1
2
3 Tiedens, L. Z., & Fragale, A. R. (2003). Power moves: Complementarity in submissive and
4 dominant nonverbal behavior. *Journal of Personality and Social Psychology*, 84, 558-
5 568.
6
7
8
9
10 Uldall, B., Hall, C., & Chartrand, T. (2008). *Optimal distinctiveness and mimicry*. Manuscript
11 in preparation, University of Hawaii.
12
13
14
15 van Baaren, R. B., Holland, R. W., Kawakami, K., & van Knippenberg, A. (2004). Mimicry and
16 pro-social behavior. *Psychological Science*, 15, 71–74.
17
18
19
20 van Baaren, R. B., Horgan, T. G., Chartrand, T. L., & Dijkmans, M. (2004). The forest, the trees
21 and the chameleon: Context-dependency and mimicry. *Journal of Personality and*
22 *Social Psychology*, 86, 453–459.
23
24
25
26
27 van Baaren, R. B., Maddux, W. W., Chartrand, T. L., De Bouter, C., & van Knippenberg, A.
28 (2003). It takes two to mimic: Behavioral consequences of self-construals. *Journal of*
29 *Personality and Social Psychology*. 84, 1093–1102.
30
31
32
33
34 de Vignemont, F., & Singer, T. (2006). The empathic brain: how, when and why? *Trends in*
35 *Cognitive Sciences*, 10, 435-41.
36
37
38
39 Wigboldus, D., Van Gaal, M., Dotsch, R., & Van Baaren, R. (2008). *Virtual Mimicry: Implicit*
40 *prejudice moderates the effects of mimicking*. Manuscript submitted for publication,
41 Radboud University Nijmegen.
42
43
44
45
46 Wiggins, J. S. (1982). Circumplex models of interpersonal behavior in clinical psychology. In
47 P. C. Kendall & J. N. Butcher (Eds.), *Handbook of research methods in clinical*
48 *psychology* (pp. 183-221). New York: Wiley.
49
50
51
52
53
54
55
56
57
58
59
60

Yabar, Y, Johnston, L., Miles, L., & Peace, V. (2006). Implicit behavioral mimicry:
Investigating the impact of group membership. *Journal of Nonverbal Behavior*, 30,
97-113.

For Review Only

Appendix I: Dependent variable assimilation



How similar are these two pictures?

(not at all) 1 2 3 4 5 6 7 8 9 (very much)